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2

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S.G. ROMANOVSKIY METHOD OF THERMAL TREATMENT AND DRYING OF NONCONDUCTING MATERIALS

(Description of an invention for an author's certificate)

by

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HUMAN TRANSLATION

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*<u>ye</u> initially, after vowels, and after ъ, ь; <u>e</u> elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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(Description of an invention for an author's certificate)

Romanovskiy, S.G.

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(54) S.G. Romanovskiy Method of Thermal Treatment and Drying of Nonconducting Materials.

Methods are known for heat treatment and drying of nonconducting materials, wood for example, in an electromagnetic field which is created by currents of industrial frequency.

The purpose of the invention is intensification of the process, improvement of quality, and cutting down of energy expenditures.

This goal is achieved by means of heating the material up to a temperature of 60-140°C and its isothermal holding at this temperature, and then it is cooled, to 30-60°C for example, for equalizing the temperature throughout the thickness of the material, after which the operations of heating, isothermal holding and cooling are repeated up until a material with the assigned final moisture content is obtained. Here the supply of heat to the material may be either discrete-conductive or radiation-convective, for example, from ferromagnetic elements which do not come in contact with the material being treated.

The proposed method makes it possible to increase the efficiency of heat transfer without using high rates of blowing through of air and high temperatures of the drying agent. The powerful sources of heat are distributed uniformly (along the thermal flow) inside the layer of the material (or stack) being dried: the material is heated simultaneously over its entire volume and the moisture is moved toward its surface without a temperature gradient, therefore the process takes place without the development of significant stresses in the material.

In the proposed method the transfer of heat by thermal conductivity from the metal to the material has a discrete nature (local contact heating) in combination with convective heat exchange from the air to the material through the open surfaces. Local convective heat exchange is accompanied by external moisture exchange, i.e., by the transfer of vapor from the surface of the material into the surrounding moist air. Local contact heating of the surface of the material raises its temperature and creates a temperature gradient inside the zone of vaporization. The presence of discrete contact surfaces makes it possible to realize intensive external moisture exchange through the open surfaces of the material.

The advantages of the proposed method include the following.

The surface of the material being treated which is in contact with the heating surface (sector of metal) has an increased temperature, causing a considerable local saturation of the air. Under the sector of the metal surface the moisture content of the air is close to 100%. Due to this, and also due to the presence of the temperature gradient, the moisture on this sector of the zone of saturation diffuses inside the material, since the partial pressure of the vapor at the surface of the material on this sector is greater than inside the material in the zone of vaporization.

As the moisture moves inside of the material it is condensed, since the pressure of the moving vapor is greater than the pressure of the saturated vapor of the material at this temperature. This is contributed to by capillary condensation, when the vapor phase of the moisture converts to liquid in the case of lower partial pressures. The condensation of the vapor phase not only increases the coefficient of heat transfer, but also creates a uniform temperature field in the zone of the moist material, i.e., in the greater portion of the moist material.

Also the condensing vapor phase of moisture in the material has a physico-mechanical bond (capillary moisture and wetting moisture), it is removed readily with further drying. The absorption and diffusion-osmotic (most difficult to remove) moisture, in vaporizing converts into a vaporous phase, then is removed partially into the

surrounding air, and, being mixed inside the material during condensation, is converted partially into capillary moisture. Consequently the physico-chemical bond of moisture with the material converts into physical-mechanical, which increases the processing properties of the material significantly (absence of warping and cracking of the material in the process of drying and heat treatment).

Subject of the invention.

1. A method of heat treatment and drying of nonconducting materials, wood for example, in an electromagnetic field which is created by currents of industrial frequency, characterized by the fact that for the purpose of intensification of the process, improvement of quality and cutting down of energy expenditures the material is heated up to a temperature of 60-140°C, subjected to isothermal holding at this temperature, and then cooled, to 30-60°C for example, for equalizing the temperature throughout the thickness of the material, after which the operations of heating, isothermal holding and cooling are repeated, over and over for example, until the assigned final moisture content is obtained.

2. The method in point 1 is characterized by the fact that the material is heated with discrete-conductive heat supply.

3. The method in point 1 is characterized by the fact that the material is heated with radiation-convective heat supply, for example, from ferromagnetic elements which do not come into contact with the material which is being treated.